

INTEGRATED AUDIO AMPLIFIER

The TCA760B is a monolithic integrated audio amplifier incorporating high flexibility for applications in battery and mains-fed equipment.

Due to special internal circuitry (stabilization, temperature correction, high a.c. feedback of 20 dB) the cross-over distortion is negligible over the entire supply voltage range (5 to 14 V). Presetting is not required for the quiescent current (5 to 15,7 mA), it is internally adjusted.

Additional features are :

- low noise output voltage;
- high peak current (1 A);
- high unloaded supply voltage (15 V);
- high gain (closed loop 15 dB at a feedback of 20 dB);
- safe operation regarding second breakdown;
- high ripple rejection.

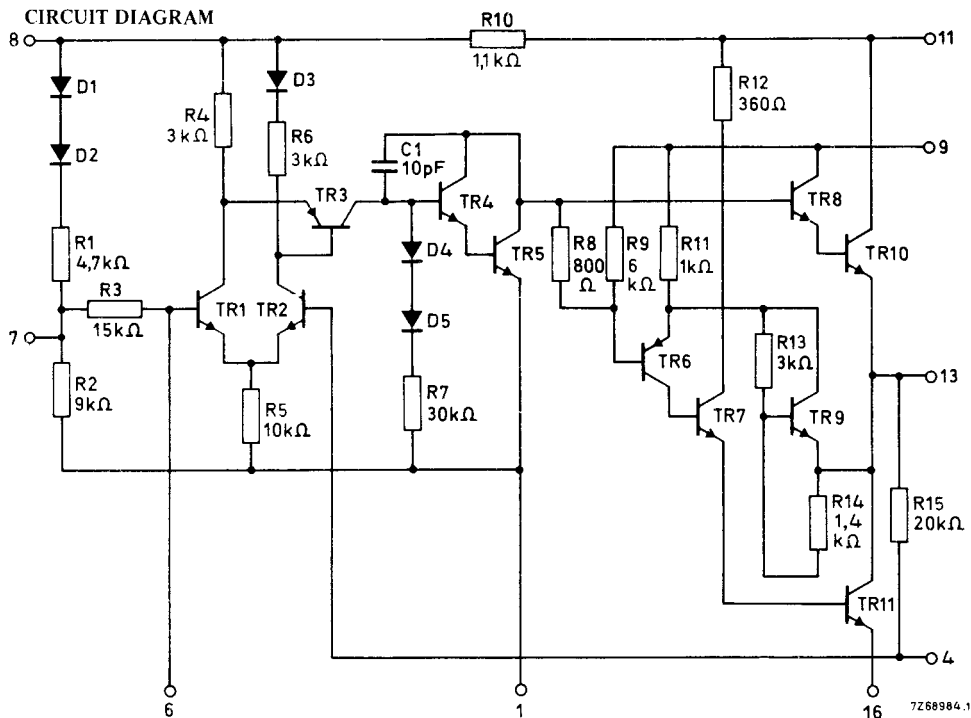
The device will withstand repetitive short circuits across the speaker load if the absolute maximum junction temperature is not exceeded.

QUICK REFERENCE DATA

Supply voltage range	V_P	5 to 14	V
Total quiescent current	I_{tot}	5 to 15,7	mA
Supply voltage (peak value)	V_{PM}	max. 15	V
Output power at $d_{tot} = 10\%$			
at $V_P = 9\text{ V}; R_L = 8\ \Omega$	P_o	typ. 1,1	W
at $V_P = 12\text{ V}; R_L = 8\ \Omega$	P_o	typ. 2,1	W
Total distortion before clipping	d_{tot}	typ. 0,7	%
Input impedance	$ Z_i $	typ. 15	$k\Omega$
Sensitivity for P_o at $d_{tot} = 10\%$	V_i	typ. 10	mV

PACKAGE OUTLINE

16-lead DIL; plastic (SOT-38).



RATINGS Limiting values in accordance with the Absolute Maximum System (IEC 134)

Voltages

Supply voltage (pin 11)	V ₁₁₋₁₆	max.	14	V
Unloaded supply voltage (pin 11; peak value) (no-signal condition)	V _{11-16M}	max.	15	V

Currents

Output current (pin 13, 11, 4)	I _O	max.	1	A
Non-repetitive peak output current (pin 13, 11, 4)	I _{OSM}	max.	2	A

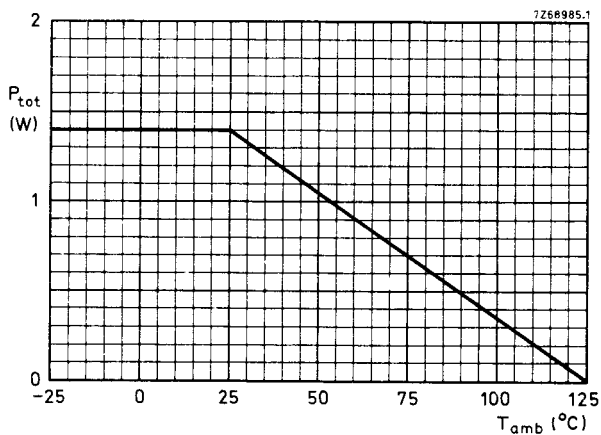
Power dissipation ¹⁾

Total power dissipation at T _{amb} = 25 °C	P _{tot}	max.	1,4	W
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Temperatures

Storage temperature	T _{stg}	-55 to +125	°C
Operating ambient temperature	T _{amb}	-25 to +125	°C

¹⁾ See derating curve on page 3.



Design data

Pin 6 to 4 voltage

$\pm V_{6-4}$ max. 6 V

Pin 13 to 16 voltage

V_{13-16} max. 14 V

Pin 11 to 13 voltage

V_{11-13} max. 14 V

CHARACTERISTICS at $T_{amb} = 25^{\circ}\text{C}$; $V_P = 9\text{ V}$; $R_L = 8\ \Omega$ unless otherwise specified

D.C. characteristics

Supply voltage range	V_{11-16}	5 to 14 V
Total quiescent current	$I_{11\text{ tot}}$	$\begin{cases} \text{typ.} & 10\text{ mA} \\ & 5\text{ to }15,7\text{ mA} \end{cases}$ 1)
Saturation voltages of output stages at $I_O = 0,5\text{ A}$	V_{CEsat}	< 0,9 V

A.C. characteristics

A.F. output power at onset of clipping at $d_{tot} = 10\%$	P_O	typ. 0,8 W	3)
	P_O	typ. 1,1 W	
Open loop voltage gain	G_V	typ. 70 dB	
Total harmonic distortion at $P_O = 0,7\text{ W}$	d_{tot}	$\begin{cases} \text{typ.} & 0,7\% \\ & < 3\% \end{cases}$	
Noise output power at $R_S = 0$	P_n	typ. 2 nW	1)2)
Input sensitivity at $P_O = 0,7\text{ W}$	V_i	4 to 8,5 mV	
Input impedance	$ Z_i $	typ. 15 k Ω	
Equivalent input noise voltage at $R_S = 7\text{ k}\Omega$	V_n	$\begin{cases} \text{typ.} & 1,5\ \mu\text{V} \\ & < 3,0\ \mu\text{V} \end{cases}$	1)2)

1) Measured without signal.

2) Measured at a frequency ranging from 30 Hz to 15 kHz.

3) Measured across R_L .

APPLICATION INFORMATION

Supply voltage V_{11-16}	6	6	7,5	7,5	9	9	10	12	V
Load resistance R_L	4	8	4	8	4	8	8	8	Ω
A. F. output power at onset of clipping	0,45 0,42	0,35 0,33	0,8 0,7	0,6 0,57	1,1 1,0	0,9 0,8	1,2 1,1	1,4 1,3	W 1) W 2)
A. F. output power at $d_{tot} = 10\%$	0,66 0,62	0,48 0,46	1,1 1,0	0,8 0,78	1,5 1,4	1,2 1,1	1,5 1,45	2,1 2,0	W 1) W 2)
Sensitivity for $P_o = 50 \text{ mW}$ V_i	1,4	2,0	1,4	2,0	1,4	2,0	2,0	2,0	mV
for $d_{tot} = 10\%$ V_i	4,8	7,0	8,0	9,0	10	10	11,0	12,0	mV
T_{amb} (maximum)	93	107	78	99	45	87	81	45	$^{\circ}\text{C}$
Supply current for full output power	185	125	225	165	300	190	215	250	mA
Quiescent current I_{tot}	10,0	10,0	10,0	10,0	10,0	10,0	10,0	10,0	mA
Value of R1	47	47	47	47	47	47	47	47	Ω
R2	100	100	100	100	100	100	100	100	Ω
R3	1	1	1	1	1	1	1	1	Ω
C1	1,6	1,6	1,6	1,6	1,6	1,6	1,6	1,6	μF
C2	47	47	47	47	47	47	47	47	μF
C3	125	125	125	125	125	125	125	125	μF
C4	470	220	470	220	470	220	220	220	μF
C5	1000	470	1000	470	1000	470	470	470	μF
C6	150	150	150	150	150	150	150	150	nF
C7	47	47	47	47	47	47	47	47	μF
Input impedance $ Z_i $	15	15	15	15	15	15	15	15	k Ω
Closed loop voltage gain G_v	50	50	50	50	50	50	50	50	dB 3)
Open loop voltage gain G_v	66	68	70	71	70	74	76	78	dB
Frequency response	← see pages 9 and 10 →								
Noise output power P_n			4			2			nW 4)
Noise output power P_n			50			25			nW 5)

1) Measured before output capacitor (C5).

2) Measured across R_L .

3) At $R_1 = 47 \Omega$. The gain can be increased by decreasing the value of R_1 ; at decreasing the gain level however the maximum tolerated value of R_1 amounts to 100Ω ; at further decrease of the gain an attenuator at the input is preferred.

4) $R_S = 0 \Omega$; frequency range 30 Hz to 15 kHz.

5) $R_S = 7 \text{ k}\Omega$; frequency range 30 Hz to 15 kHz.

APPLICATION INFORMATION (continued)

General notes

1. Prescription for print lay-out :

Pin 1 must be used as a ground connection for the input circuit.

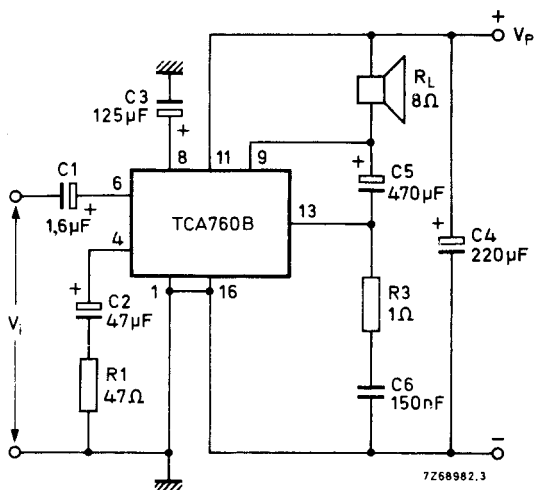
Pin 16 must be used for the output circuit and for connection of the negative supply voltage.

The pins 16 and 1 have to be interconnected as close to the package as possible to prevent a common impedance in the ground line.

2. The smoothing capacitor across the supply must be connected close to the pins.

3. To prevent radio signals in the low frequency amplifier a small capacitor of about 560 pF between pins 6 and 1 is preferred.

Basic power amplifier

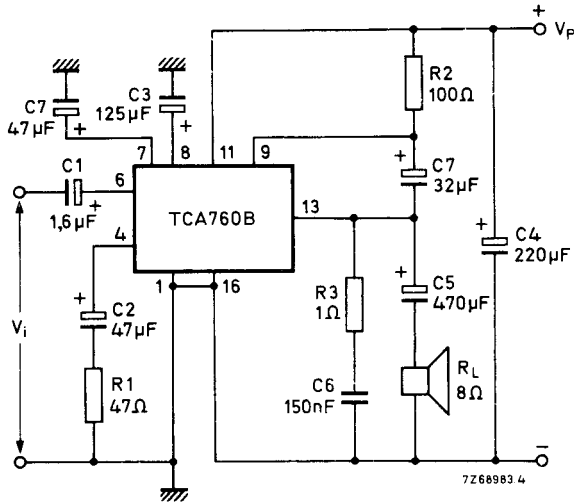


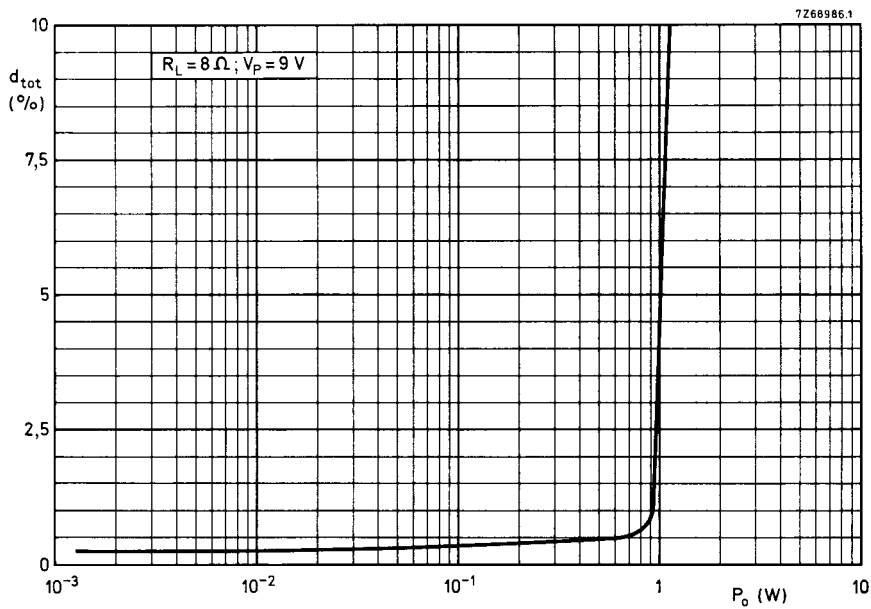
APPLICATION INFORMATION (continued)

Power amplifier for mains-fed supply

When using a mains-fed power supply with high ripple it is advantageous to connect the speaker to ground by bootstrapping pin 9.

Pin 7 is available for extra hum suppression (see graphs on page 9).





APPLICATION INFORMATION (continued)

The influence on the hum suppression when a capacitor of 10 μF is connected between pins 7 and 1 is shown in the graph below.

An increase of the capacitor value gives no further improvement in hum suppression.

